

Application No. 10/077,180

AMENDMENTS TO THE CLAIMS

A detailed listing of all claims that are, or were, in the present application, irrespective of whether the claim(s) remains under examination in the application are presented below. The claims are presented in ascending order and each includes one status identifier. Those claims not cancelled or withdrawn but amended by the current amendment utilize the following notations for amendment: 1. deleted matter is shown by strikethrough; and 2. added matter is shown by underlining.

1. (Original) A method for fabricating a magnetic device using semiconductor technology comprising the steps of:

forming a first conductor over a substrate;

patternning a first photoresist layer disposed over the first conductor to form via holes that expose a portion of the first conductor;

formng first partial via structures within the via holes that are connected to the first conductor;

formng a second photoresist layer disposed over the first conductor and first partial via structures and using the second photoresist layer to form a magnetic core arrangement disposed over the first conductor;

patternning a third photoresist layer disposed over the magnetic core arrangement and the second photoresist layer to form via holes co-linear with the first partial via structures;

formng second partial via structures within the co-linear via holes that are connected to the first partial via structures; and

Application No. 10/071,180

forming a second conductor over the magnetic core arrangement connected to the second partial via structures, thereby forming via structures adapted to electrically connect the first conductor to the second conductor.

2. (Original) The method of claim 1 wherein forming the first conductor over the substrate comprises:

forming an insulative layer on the substrate;  
forming a composite metal layer on the insulative layer; and  
forming the first conductor using a photoresist mold formed on the composite metal layer, the photoresist mold exposing a portion of the composite metal layer, by removing a top layer of the composite metal layer and depositing a first conductor material within the photoresist mold and over the exposed portion of the composite metal layer.

3. (Original) The method of claim 2, wherein the composite metal layer is comprised of a copper layer interposed between a bottom and top layer of titanium.

4. (Original) The method of claim 1, further comprising using the patterned first photoresist layer as a first interlayer dielectric layer between the first conductor and the magnetic core arrangement upon heat curing the first photoresist layer.

Application No. 10/077,180

5. (Original) The method of claim 4, further comprising forming a magnetic core seed layer over the interlayer dielectric layer and removing a top layer of the magnetic core seed layer before forming the magnetic core arrangement.

6. (Original) The method of claim 5, further comprising forming a second conductor seed layer over a second interlayer dielectric layer, using the patterned third photoresist layer, before forming the second conductor.

7. (Original) The method of claim 6, further comprising removing portions of the second conductor seed layer extending beyond the via structures and encapsulating the magnetic device.

8. (Original) The method of claim 7, further comprising removing portions of the composite metal layer extending beyond the via structures.

9-10. (Cancelled).

11. (Original) A method for fabricating a magnetic device using semiconductor technology comprising the steps of:

forming a first conductor over a substrate;  
patterning a first photoresist layer disposed over the first conductor, thereby forming via holes that expose a portion of the first conductor;

Application No. 10/077,180

forming first partial via structures within the via holes that are connected to the first conductor;

patternning a second photoresist layer disposed over the first conductor and first partial via structures to form via holes co-linear with the first partial via structures;

forming second partial via structures within the co-linear via holes that are connected to the first partial via structures;

forming a magnetic core arrangement disposed over the first conductor using a portion of the second photoresist layer;

patternning a third photoresist layer disposed over the magnetic core arrangement and the second partial via structures to form via holes co-linear with the second partial via structures;

forming third partial via structures within the co-linear via holes that are connected to the second partial via structures; and

forming a second conductor over the magnetic core arrangement connected to the third partial via structures, thereby forming via structures adapted to electrically connect the first conductor to the second conductor.

12. (Original) The method of claim 11, wherein forming the first conductor over the substrate comprises:

forming an insulative layer on the substrate;

forming a composite metal layer on the insulative layer; and

forming the first conductor using a photoresist mold formed on the composite metal layer, the photoresist mold exposing a portion of the composite metal layer, by removing a top

Application No. 10/077,180

layer of the composite metal layer and depositing a first conductor material within the photoresist mold and over the exposed portion of the composite metal layer.

13. (Original) The method of claim 12, wherein the composite metal layer is comprised of a copper layer interposed between a bottom and top layer of titanium.

14. (Original) The method of claim 11, further comprising using the patterned first photoresist layer as a first interlayer dielectric layer between the first conductor and the magnetic core arrangement upon heat curing the first photoresist layer.

15. (Original) The method of claim 14, further comprising forming a magnetic core seed layer over the interlayer dielectric layer and removing a top layer of the magnetic core seed layer before forming the magnetic core arrangement.

16. (Original) The method of claim 15, further comprising forming a second conductor seed layer over a second interlayer dielectric layer, using the patterned third photoresist layer, before forming the second conductor.

17. (Original) The method of claim 16, further comprising removing portions of the second conductor seed layer extending beyond the via structures and encapsulating the magnetic device.

Application No. 10/077,180

18. (Original) The method of claim 17, further comprising removing portions of the composite metal layer extending beyond the via structures.

19. (Original) A method for fabricating a magnetic device using semiconductor technology comprising the steps of:

forming a first conductor over a substrate;

patternning a first photoresist layer disposed over the first conductor and using the first photoresist layer as an interlayer dielectric and to form a magnetic core arrangement disposed over the first conductor;

patternning the first photoresist layer to form via holes that expose a portion of the first conductor and forming first partial via structures within the via holes that are connected to the first conductor;

patternning a second photoresist layer disposed over the magnetic core arrangement and the first partial via structures to form via holes co-linear with the first partial via structures;

forming second partial via structures within the co-linear via holes that are connected to the first partial via structures; and

forming a second conductor over the magnetic core arrangement connected to the second partial via structures, thereby forming via structures adapted to electrically couple the first conductor to the second conductor.

20. (Original) A method for fabricating a magnetic device using semiconductor technology comprising the steps of:

Application No. 10/077,180

forming a first conductor over a substrate;

pattern a first photoresist layer disposed over the first conductor to form via holes that expose a portion of the first conductor;

forming first partial via structures within the via holes that are connected to the first conductor;

forming a magnetic core arrangement disposed over the first conductor using a portion of a second photoresist layer disposed over the first photoresist layer and the first partial via structures;

pattern the second photoresist layer to form via holes co-linear with the first partial via structures;

forming second partial via structures within the co-linear via holes that are connected to the first partial via structures;

pattern a third photoresist layer disposed over the magnetic core arrangement and the second partial via structures to form via holes co-linear with the second partial via structures;

forming third partial via structures within the co-linear holes that are connected to the second partial via structures; and

forming a second conductor over the magnetic core arrangement connected to the third partial via structures, thereby forming via structures adapted to electrically connect the first conductor to the second conductor.

21. (Original) The method of claim 1, further comprising providing the substrate having an insulating layer thereon, wherein the substrate is void of active components associated therewith

Application No. 10/077,180

and wherein fabrication of the magnetic device occurs separately, distinctly, and on a different substrate from the fabrication of active components to which said magnetic device may be connected.

22. (Original) The method of claim 1, wherein the magnetic core arrangement is comprised of at least two elongate sections separated by a central aperture and at least two short sections separated by the central aperture.

23. (Original) The method of claim 1, wherein the first conductor and the second conductor are electrically connected to produce a winding selected from a group consisting of: a simple winding, a bifilar winding, and a multifilar winding.

24. (Original) The method of claim 22, further comprising the step of subjecting the magnetic core arrangement to an external magnetic field to align an easy axis of said magnetic core along a desired direction relative to said at least two elongate sides.

25. (Original) The method of claim 1, wherein forming the magnetic core arrangement comprises the steps of depositing a layer of magnetic core material and depositing a layer of dielectric material, and repeating said steps until said magnetic core is of a desired thickness.

Application No. 10/077,180

26. (Currently Amended) The method of claim [[25]] 1, wherein said step of depositing a layer of magnetic core material includes incorporating an air gap into said layer of said magnetic core material.

Please add new claim 27 as follows:

27. (New) The method of claim 1, wherein the magnetic core arrangement is comprised of four equal length sections surrounding a central aperture.